

Interactive comment on “A compilation of global bio-optical in situ data for ocean-colour satellite applications” by A. Valente et al.

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Dear Referee #2,

Thank you very much for the comments provided. We have addressed all the comments as shown below. We have added more information, redrawn Figures and added a new Figure.

Referee #2,

This paper presents a newly compiled database of relevant bio-optical parameters for validation of products derived from ocean colour satellites. Specifically, the authors have combined data from existing datasets and provided the new larger database in a convenient format, with the principal motivation to aid validation of satellite products

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within the OC-CCI program. However, the database will prove useful to the much wider remote-sensing and bio-optical oceanography community as well. The manuscript provides a clear description of the data along with an overview of data distribution and variability. The necessary quality control, removal of duplicates, re-organising of data etc. is well informed and well articulated. The database is easy to download and contains relevant meta-data. Overall, I support publication of the manuscript and database following minor changes. I have provided general and technical comments below, which I believe would help improve the manuscript prior to publication.

General Comments

Comment: It seems an odd choice to include chl_a concentrations derived from an in situ fluorometer from the NOMAD database but not for the other datasets. Though I can see that the choice is justified for consistency with previous satellite validations, including these data is unappealing for other potential users. It would be highly desirable to identify these data so that a user can easily choose to omit them. For example, add “chl_a_insitu” parameter in addition to “chl_a_hplc” and “chl_a_fluor”, or assign some kind of quality flag. If this is not possible then please include some indication of which data these are (i.e. are they from particular regions, date ranges?) and what (if any) calibrations, quenching corrections, etc. were done to create these data values.

Response: While addressing this comment, we found that all chlorophyll-a observations derived from in situ fluorometry in the NOMAD dataset were before 1997, thus they were excluded from the present compilation during the pre-processing stage (this work only includes data between 1997 and 2012). Thus the compiled chlorophyll-a data from NOMAD data is all from in-vitro fluorometry or HPLC, and consistent with protocols chosen in this work. Given this, we have now deleted from the NOMAD section (Page 11, Line 3-4) the following text: “and a small number of “chl_a_fluor” were from in situ fluorometry (Werdell and Bailey, 2005)”.

Comment: It would add significant value to the manuscript to plot (and quote the coeffi-

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cients for) the new relationships for the dataset presented in Fig 10 and 15, with a brief summary of how the new data compilation compliments or improves on the existing relationships shown in the figures.

Response: We understand the point of this comment, but we think it is out of the scope of the present manuscript. The Figures 10 and 15 are used to show that the compiled data (with concurrent bio-optical variables) do not deviate significantly from published bio-optical relationships. For example, please note that the points shown in Figure 10 and 15 are not the points that should be used to make the relationships shown for reference. For example, Figure 10 shows stations that have any blue-green ratio (e.g. 443/555 or 490/560) to maximize visualization for quality checking, but for calculation of an algorithm similar to NASA OC4 and NASA OC4E we would need to restrict the stations to those that have simultaneous spectral data at 443, 490, 510 and 555 nm (for OC4) and 443, 490, 510 and 560 nm (for OC4E). Similarly, Figures 15c and 15d do not show exactly the points that should be used for calculation of a similar relation to NASA KD2S and Tiwari algorithms, respectively; these Figures show points with a 5 nm search window to maximize visualization; but for algorithm calculation, we would use a search window of 2 nm, which would decrease the number of points. Secondly, please note that the NASA's OC4, OCE and KD2S algorithms, and the Tiwari algorithm are built upon the NOMAD dataset. With the present data compilation, and following similar algorithm methodologies, the contribution of NOMAD would be 96 %, 75 %, 95 % and 100 % for OC4, OCE, KD2S and Tiwari algorithms, respectively. Therefore, perhaps only OC4E algorithm could be complemented with data from this work. In regard to the Bricaud et al. (2004) algorithm shown in Figure 15a, a preliminary step for a comparison would be to first distinguish the data points in common (for which we provide metadata), but again this could be done in another work.

Comment: The paper provides a good overview of spatial coverage of data. Please add brief information on the temporal coverage (i.e. note any seasonal biases in certain areas or data types).

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Response: Information about the temporal coverage of all compiled variables was added with a new figure (now Figure 3, with all other Figures renamed). Throughout discussion, as each variable is discussed, the new Figure 3 is referred to discuss temporal coverage of the variable in question.

Comment: It would be preferable, if possible, to include all available wavelengths of observational data (e.g. phytoplankton light absorption, backscatter), rather than providing a subset of waveband averages. Doing so would add value for wider user community, while not diminishing from using the data for satellite validation (details on averaging into satellite wavebands could be provided in the manuscript).

Response: We agree. In fact, all original wavelengths were included in the present work. The main table (where all wavelengths are available) is the one discussed in the manuscript. Additionally, and only for help with data manipulation, two other tables (derived from the main table) are provided. In these two additional tables, only spectral data within 2nm (or 6nm) of each satellite band is provided. For these two tables, we also note that we have not performed any satellite waveband-average, but chose the closest spectral observation to a given centre-wavelength satellite-band.

Technical Comments

Comment: Check all acronyms are defined on first use and that the acronyms are used thereafter. Especially check Es (Page 8, Line 19), HPLC, and CDOM are defined on first use.

Response: Es was already defined in Page 4 Line 15. HPLC was now first defined at Page 4 line 30. CDOM was now first defined at Page 5 Line 15.

Comment: Page 3 Line 26. Change “results” to “data”.

Response: The word “results” was changed to “data”

Comment: Page 4 Line 28: “. . .biomass and is the most widely-used satellite ocean-colour product.” Please back up with a reference.

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Response: The phrase was edited to "...and one of the most widely-used satellite products", and the following reference was added: IOCCG (2008). Why Ocean Colour? The Societal Benefits of Ocean-Colour Technology. Platt, T., Hoepffner, N., Stuart, V. and Brown, C. (eds.), Reports of the International Ocean-Colour Coordinating Group, No. 7, IOCCG, Dartmouth, Canada.

Comment: Page 4 Line 30 Change ". . .methods, but for abbreviation it is referred from hereafter as "chl_fluor" to "... . .methods, referred to hereafter as "chl_fluor".

Response: The phrase ". . .methods, but for abbreviation it is referred from hereafter as "chl_fluor" was changed to ". . .methods, referred to hereafter as "chl_fluor".

Comment: Page 13 Line 3: Please provide a reference for the expected relationship between chl_a_hplc and chl_fluor (e.g. Trees et al. 1985 Marine Chemistry 17:1-12).

Response: The suggested reference was added: "Trees, C. C., Kennicutt II, M. C., Brooks, J. M. 1985. Errors associated with the standard fluorimetric determination of chlorophylls and phaeopigments. Marine Chemistry, 17: 1-12."

Comment: Page 15 Line 8-18. Details of the wavelengths for spectral data could be better placed in separate section or moved to where this issue is first discussed (following Page 12 Line 12).

Response: A separate section was created (APENDIX B: Data table) to where the referred text was transferred. Note that this text only deals with the table format and accompanying files. The following phrase was added at the start of the text: "The compiled data are available at <http://doi.pangaea.de/10.1594/PANGAEA.854832>."

Comment: All figures and tables. It makes more sense to use the same text format for datasets as in main text and tables (i.e. not all lower case capital letters), since they are mainly acronyms.

Response: Figures (2, 4, 8, 11 and 14), Table 3 and text were edited so that the same text format for datasets is used across the manuscript.

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Comment: Fig 3. Please choose more distinguishable colours for Aeronet_oc and Moby data, they're currently very hard to tell apart.

Response: More distinguishable colours for AERONET-OC and MOBY data were chosen in Figure 3.

Comment: Fig 10 caption. Change “. . .maximum band ratio. . .” to “. . .maximum band ratio (as defined in text). . .”

Response: Fig 10 caption was changed from “. . .maximum band ratio. . .” to “. . .maximum band ratio (as defined in text). . .”

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